carefully sought, and treated by diet, phosphorus, and lime, you will not have done your whole duty. Most painstaking and thorough should be your investigation of the digestive system and correction of all its errors. Judicious warnings should be given to parents of precocious children, urging them to forbear the exhibition of the unnatural brightness of the tender little minds, and to protect them from traumatism, as these children seem to be prone to fall, because, as I believe, they are slow to acquire spatial and postural judgment.

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EXTERNAL URETHROTOMY.[1]

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EXTERNAL urethrotomy for the relief of stricture is an operation so frequently performed by the members of this Association that it is with some hesitation I bring it before them for their consideration and discussion.

My object in so doing is not to advance new or original methods, but rather to accentuate certain points in the technique of the operation and the after-treatment of the case, which in my hands have given better and more permanent results than are frequently encountered following this operative procedure. Such conditions as recontraction of the stricture, perineal abscess, or fistula, and uncured urethro-cystitis are not uncommon, being due partially to the patient's ignorance or neglect, and partially to faulty operative and post-operative procedures, and can in a great measure be avoided if the following points are carefully carried out.

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[1] Read before the American Association of Genito-Urinary Surgeons, West Point, June 7, 1898.

DIVISION OF THE STRICTURE. The patient having been properly prepared and placed, the urethra is opened on its floor by a single clean incision and all of the stricture tissue completely divided in the median line, not only on the floor, but also on the *roof* of the canal; this latter procedure I am convinced is not invariably carried out, as in many of these cases which I have personally examined, on endeavoring to pass a sound some time after the operation (in one case as early as the second week, in two cases at the end of the fourth week, and others at longer intervals) a mass of indurated tissue could be distinctly felt projecting from the roof of the canal, to pass over and, if possible, beyond which, the tip of the instrument had to be forcibly depressed toward the perineum; this mass I take to be uncut stricture-tissue, or if it was divided at the time of the operation, this was not completely done, or was not followed by proper local measures. It is claimed by some that cutting on the roof of the canal in this region is liable to cause severe hemorrhage; this accident, if it occurs, is due, I think, to over-zealous cutting, with a view to subsequently passing unnecessarily large sounds. In over eighty of these cases I have not had any hemorrhage either at or after the operation. In order to ascertain if all of the stricture tissue has been completely divided the index-finger, with the palmar surface directed upward, should be passed into the perineal wound and down to healthy urethra, well in front of the stricture, and then backward on the roof of the canal into the bladder, as on its way it readily detects any bands or masses that have not been thoroughly divided; whereas, if a sound passed from the meatus be alone relied on, it will usually enter the bladder with ease, as the floor of the urethra, being cut away, allows the convexity of the instrument to bulge down and out and the tip to slip over the obstruction on the roof, thus giving the operator a faulty idea as to the real condition of the canal. The dilatation of the posterior urethra by the index-finger passed into the bladder, prevents in a great measure post-operative tenesmus, as in the majority of these cases this portion of the canal is found to be so rigid, firm, and contracted that it often requires several minutes to overcome this condition and restore its normal patulousness; in other words, we over-dilate and paralyze the contracted prostatic fibres, and in this way prevent their physiological action for some time, thus giving the gland and bladder much-needed rest and reducing their inflamed and congested condition. The perineal operation being completed, a full-sized sound should be passed from the meatus into the bladder, to ascertain that the whole length of the urethra is clear; if obstructions exist, they may be removed by meatotomy, internal urethrotomy, or post-operative dilatation.

BLADDER DRAINAGE. Bladder drainage after these operations is a most important factor, and seems, judging from the literature and the work of different operators, to be as yet an unsettled question, both as regards the best method of, and proper time for, the retention of the drain, some advising the use of a silver or soft-rubber catheter, draining through the urethra; others gauze drainage through the wound; some no drainage at all, and still others a large perineal tube, which latter method is in my experience far the best, if properly employed, as it keeps the bladder well drained, dilates the posterior urethra and, to a certain extent, the divided stricture, and is an ever-ready route for bladder irrigations, which are so essential in the treatment of the urethro-cystitis which so often exists in these cases, and which, strange to say, is so frequently ignored or overlooked. A large soft-rubber perineal tube is selected and introduced into the bladder just far enough to allow the urine to drain freely. This position is accurately ascertained at the time of the operation by irrigating the bladder through the tube and noting the amount and force of the outflow as the tube is slowly withdrawn. The tube is then secured in place by a heavy silk suture passed directly through it and both edges of the wound, which is then lightly packed with gauze, and the suture tied, thus preventing the tube from slipping either in or out; the bladder is then irrigated and partially filled with warm boric acid or salt solution and the tube clamped until the patient is put to bed, when it is attached to the usual siphon apparatus. The receptacle for the urine should be placed somewhat lower than the bladder, but not too low, as the suction then becomes quite strong and causes some patients painful sensations in the bladder, with, perhaps, tenesmus.

In from two to four days after the operation the tube is taken out, washed, and replaced; it is removed permanently on the fifth to the seventh day, and the patient is allowed to be up and about and passing his urine both by the urethra and the perineal incision, pressing a pad of gauze against the wound as he does so. In the majority of cases all of the urine is passed by the urethra in about one week after the removal of the tube, but in some the urethral wound remains patulous for several weeks. This usually occurs in cases in which the perineal wound has not received proper treatment, and when no sounds have been passed either at or after the operation; also in alcoholic or debilitated subjects, and in cases in which the urethra has been extensively cut for the cure of urinary fistulæ and sinuses.

POST-OPERATIVE DILATATION. When the tube is first taken out, on the second or the fourth day, for cleaning, a medium-sized sound is passed to the bladder and held there for about a minute; this is repeated regularly every second or third day, until the perineal wound is cicatrized, and the urethra taking a No. 28 to 30 French with ease, according to the case, when the intervals are made longer. It is surprising to note how little pain the passage of the first sound causes, provided it be warm, well lubricated, and introduced slowly, with its tip hugging the roof of the canal. After the sound is removed the tube is replaced and the bladder and urethra are gently irrigated with hot boric acid or salt solution, and on the alternate days, if indicated, with mild solutions of permanganate of potassium or nitrate of silver.

TREATMENT OF THE PERINEAL WOUND. The perineal wound should be personally inspected every day to see that it is healing solidly from the bottom by firm, healthy granulations, and not allowed to bridge over in places or fill up with pale, flabby tissue. This can be prevented by running the finger firmly, but gently, through the bottom of the wound from end to end, the patient lying on his abdomen, or in the lithotomy position, with thighs widely separated, and in a good light; exuberant granulations are removed by the nitrate of silver stick or curved scissors, and the wound dressed lightly with gauze. When the perineal wound is cicatrized, the urethra taking a full-sized sound with ease and the urethro-cystitis improving, the patient must be made to understand clearly that the operation has not cured his stricture, but merely divided it, and that he must continue to have sounds passed at long intervals for the remainder of his life; also that he must not stop bladder or urethral medication until urination is normal and the urine practically free from tissue elements.

The following cases, briefly detailed, have been selected from my records, as they show results dating from two years to two years and a half after operation, and may therefore be considered of value. Many similar cases could have been given, but these were deemed sufficient to illustrate the above points. In one case the stricture was traumatic, in the others gonorrhœal in origin, one patient having three well-marked contractions. The operations performed included those of Gouley, Wheelhouse, and a combined internal and external urethrotomy.

CASE I.—Patient aged forty years. One gonorrhœal stricture at bulbo-membranous junction, impassable to instruments. Severe urethro-cystitis. Wheelhouse operation. Fourth day: Perineal tube taken out, cleaned, and replaced, and a No. 25 French sound passed. Fifth day: Tube removed permanently. Seventh day: All urine passed by the urethra. Patient up and about. Fourteenth day: Wound cicatrized. Examination of this patient two and one-half years after the operation shows the urine to be clear, with a few light, floating mucous flakes, the urethra soft and taking a No. 28 French sound with ease. Urination is normal.

CASE II.—Patient aged thirty-two years. One gonorrhœal stricture in the bulbous urethra, admitting a filiform. Severe urethro-cystitis.

Gouley's operation. Fifth day: Tube taken out permanently, and a No. 25 French sound passed. Patient up and about. Ninth day: All urine passed by the urethra. Fourteenth day: Wound cicatrized. Two and one-half years after operation this patient takes a No. 30 French sound with ease, urination is normal, and the urine practically clear.

CASE III.—Patient aged forty-five years. One traumatic stricture, admitting a filiform, at bulbo-membranous junction. Ammoniacal cystitis. Gouley's operation. Second day: Tube taken out, washed and replaced, and a No. 28 French sound passed. Fifth day: Tube removed permanently. Patient up. Tenth day: All urine passed by urethra. Sixteenth day: Wound cicatrized. Two years after the operation this patient takes a No. 30 French sound with ease, urinates normally, and his urine is clear, with a few light flakes.

CASE IV.—Patient aged twenty-three years. Three dense gonorrhœal strictures; two in pendulous urethra, admitting Nos. 15 and 17 French, respectively, and one in bulbous urethra, taking a filiform. Very severe urethro-cystitis. Internal and external urethrotomy. Third day: Tube taken out, washed, and replaced, and a No. 27 French sound passed. Fifth day: Tube removed permanently. Seventh day: All urine passed by urethra. Patient up and about. Fifteenth day: Wound cicatrized. Two years after operation patient takes a No. 30 French sound with ease, his urine is clear, and urination normal.

A REPORT ON SIX CASES IN WHICH THE BACILLUS AËROGENES CAPSULATUS WAS ISOLATED.

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THE occurrence of gas in the living tissues and the presence of gas after death in larger and smaller bubbles in the viscera, especially in the liver, has long been known, and the cause and significance variously interpreted by clinicians and pathologists. The appearance of the viscera when riddled with gas-bubbles is so striking and peculiar that they are described by the Germans as "schaumorgane," foam-organs. In some instances air embolism was held accountable for the condition, especially when occurring after surgical operations or after childbirth. It was suspected by others that anaërobic bacilli, wandering out of the intestinal canal after death, give rise to the gas productions. It was thus held to be a form of post-mortem decomposition, and little attention was directed to it until the appearance of an article by Welch and Nuttall in 1892.[1]

With the anaërobic bacillus, which they isolated in pure culture from the organs of their case and which they described and named the bacillus aërogenes capsulatus, they were able to reproduce in the tissues of dead rabbits, after distribution of the bacilli through the circulation *intra vitam*, a complete picture of the so-called "schaumorgane" of the Germans. The causal relation between this condition and the bacillus was thus thoroughly established. Animal experimentation further convinced them that to produce such a general and extensive emphysema of the organs and tissues as was present in their case it was necessary to inject the bacilli during the continuance of the circulation, injection into the bloodvessels after death being followed only by an emphysema along the direct course of the vessels inoculated. This noteworthy fact, and the appearance of necrosis and degeneration in the tissues around the masses of bacilli and gas-cysts in the organs of their case, led them to suppose that a terminal infection with the bacillus had taken place. Except in its application to a very limited class of cases, the old views concerning the air-embolism were thus destroyed at one stroke. Too great credit cannot be attached to the authors of this article, as it has removed a piece of mediævalism concerning air-embolism from the minds of the medical profession.

To Eug. Fraenkel[2] belongs the credit of bringing out the causal relation between the bacillus phlegmones emphysematosæ and gaseous phlegmons. This bacillus is considered by Welch as identical with his bacillus aërogenes capsulatus. To the classical description of the morphology and cultural characteristics of the bacillus little of importance has since been added, except the discovery of the formation of spores on blood-serum by Dunham.[3]

Since the publication of Welch and Nuttall's preliminary study, and the study of Fraenkel on the bacillus aërogenes capsulatus, many instances of its occurrence have been described. A partial summary of the cases published previous to the year 1896, with further studies on the bacillus aërogenes capsulatus, is to be found in a second paper, not yet completed, by Welch and Flexner,[4] published in the *Journal of Experimental Medicine*, 1896. The association of a well-defined bacterium with the ante-mortem or post-mortem development of gas in the body is now well established, and a large number of illustrative cases is at our disposal, so that the record of new instances of the isolation of the bacilli aërogenes capsulatus would be itself of but moderate value. However, the conditions under which infection with the germ occurs, its full significance either as a primary or concurrent infection, and the relative frequency with which its presence is simply a post-mortem incident, offer such a series of unsolved problems as makes still desirable an increased number of examinations and records of experiments.

The intention of this paper is to give briefly the more important clinical data obtainable in the histories of six new cases examined by the writer, with the bacteriological analyses, microscopical lesions, etc. At the end of the description of each case a brief summary of the cases in